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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,352	05/21/2007	Hans Van Der Laan	081468-0356680	8164
909 7590 09/04/2008 PILLSBURY WINTHROP SHAW PITTMAN, LLP P.O. BOX 10500 MCLEAN, VA 22102				
EXAMINER				
TON, TRI T				
ART UNIT		PAPER NUMBER		
2877				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/590,352

**Applicant(s)**

VAN DER LAAN ET AL.

**Examiner**

TRI T. TON

**Art Unit**

2877

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) 21 and 42 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12, 16-20, 22-33 and 37-41 is/are rejected.
- 7) ☒ Claim(s) 13-15 and 34-36 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsman's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 12/10/07, 11/26/07, 05/21/07
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement (IDS) submitted on 12/10/07, 11/26/07, 05/21/07 have been entered. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### ***Oath/Declaration***

2. The Oath and Declaration filed on 05/21/2007 is acceptable.

### ***Drawings***

3. The drawings filed on 08/23/2006. These drawings are acceptable.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-12, 16-19, 22-33, and 37-40 are rejected under 35 U.S.C. 102(e) as being taught by Micher et al. (Publication No. US 2003/0048458). Hereafter, "Micher".

Regarding Claims 1, 22, Micher teaches obtaining calibration measurement data from a plurality of calibration marker structure sets provided on a calibration object (paragraph [0032], lines 1-6), each of said plurality of calibration marker structure sets comprising at least one calibration marker structure ([0032], lines 6-17), calibration marker structures of different calibration marker structure sets being created using different known values of said at least one process parameter (paragraph [0032], lines 17-21, [0039], [0045], [0058]);

determining a mathematical model by using said known values of said at least one process parameter ([0056], [0060]), (equations model is not different from mathematical model) and by employing a regression technique on said calibration measurement data (paragraph [0080]), said mathematical model comprising a number of regression coefficients (paragraphs [0061]-[0065] and [0066] lines 1-3);

obtaining measurement data from at least one marker structure provided on a object ([0009]-[0010], [0037], lines 1-7), said at least one marker structure being made using an unknown value of said at least one process parameter ([0037], lines 4-17, [0058], [0060], [0088]); and

determining the unknown value of said at least one process parameter for said substrate from said obtained measurement data (paragraph [0008]) by employing said regression coefficients of said mathematical model (paragraph [0060], [0080], claims 16, 17).

Regarding Claims 2, 3, 23, 24, Micher teaches calibration measurement data and said measurement data are obtained with an optical detector([0048]), (it is obvious to have a scatterometry technique used to measure the grating structure having beams detected by using

optical detector).

Regarding Claims 4, 25, Mieber teaches regression technique used by the mathematical model is selected from a group consisting of principal component regression, non-linear principal component regression, partial least squares modeling and non-linear partial least squares modeling (paragraph [0080], lines 13-14).

Regarding Claims 5, 6, 26, 27, Mieber teaches substrate comprising one of the groups consisting of a test wafer and a product wafer (paragraph [0010], lines 3-5).

Regarding Claims 7, 28 Mieber teaches at least one marker structure being positioned on said substrate within one of the group consisting of a chip area and a scribe-lane (paragraph [0032], lines 4-17).

Regarding Claims 8, 29, Mieber teaches at least one marker structure being a part of a device pattern within a chip area (paragraph [0032], lines 4-17).

Regarding Claims 9, 30, Mieber teaches at least one marker structure comprising a diffraction grating (paragraph [0044], lines 9-12).

Regarding Claims 10, 31, Mieber teaches preprocessing the obtained calibration measurement data (paragraph [0032], lines 1-6) and the obtained measurement data before said

employing said regression coefficients (paragraph [0037], lines 4-7).

Regarding Claims 11, 32, Mieher teaches preprocessing comprising performing on said data at least one of the group of mathematical operations consisting of subtraction of a mean, division by standard deviation, selection of optical parameters and weighing of optical parameters (paragraphs [0060]-[0068]), and wherein the optical parameters include at least one of the group of parameters consisting of wavelength, angle and polarization state (paragraph [0003]).

Regarding Claims 12, 33, Mieher teaches each of said plurality of calibration marker structure sets comprising at least a first and a different second calibration marker structure (paragraph [0008], lines 10-11).

Regarding Claims 16, 37, Mieher teaches at least one calibration structure within a calibration marker structure set and said marker structure have substantially comparable shapes (paragraphs [0032], [0044], lines 16-24).

Regarding Claims 17, 38, Mieher teaches calibration data and measurement data comprising spectral data (paragraph [0044], lines 16-24).

Regarding Claims 18, 19, 39, 40, Mieher teaches method being related to at least one of a lithographic apparatus and a track ([0002]), and at least one process parameter is selected

from a group consisting of focus, exposure dose, overlay error, track parameters related to dose, variation of line width over reticle, variations from reticle-to-reticle, projection lens aberrations, projection lens flare, and angular distribution of light illuminating the reticle (paragraph [0003]).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 20 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Micher et al. (Publication No. US 2003/0048458) in view of Bowley, Jr. et al. (U.S. Patent No. 6,917,901). Hereafter, “Micher” and “Bowley”.

Regarding Claims 20, 41, Micher teaches an illumination system configured to provide a beam of radiation (paragraph [0002], lines 5-8);

the patterning structure serving to impart the beam of radiation with a pattern in its cross-section (paragraph [0002], lines 9-11);

a projection system configured to project the patterned beam onto a target portion of the substrate (paragraph [0002], lines 8-11).

However, Micher does not teach a support structure and a substrate table. Bowley teaches a support structure configured to support a patterning structure (Figure 1, elements 110 and 120), (column 4, lines 49-53), a substrate table configured to hold the substrate (column 4,

lines 54-57). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify Micher by adding a support structure and a substrate table for supporting the patterning structure and holding the substrate in order to improve the measurement process for a lithographic apparatus.

***Allowable Subject Matter***

8. Claims 21 and 42 have been canceled.
9. Claims 13-15, 34-36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
10. The allowable Subject matter was indicated in office Action mailed on 07/20/2006 of the Application No. 10/853724.
11. The following is a statement of reasons for the indication of allowable subject matter: No prior art found by the examiner that suggested modification or combination with the cited art so as to satisfy the combination of all the limitations in claims 13-15, 34-36.
12. As claim 13, 34, the prior art of record taken alone or in combination, fails to disclose or render obvious “said first calibration marker structure comprises a number of non-patterned layers and said second calibration marker structure comprises the same non-patterned layers on top of which a pattern is provided.” in combination with the rest of the limitations of claims 1, 12, and 22, 33.



13. As claim 14, 35, the prior art of record taken alone or in combination, fails to disclose or render obvious “first calibration marker structure comprises a pattern with isolated lines and said second calibration marker structure comprises a pattern with dense lines or isolated spaces” in combination with the rest of the limitations of claims 1, 12, and 22, 33.

14. As claims 15, 36, the prior art of record taken alone or in combination, fails to disclose or render obvious “the first and second calibration marker structures are in close proximity to each other, such that a distance between the first and second calibration marker structure is in the same order of magnitude as a size of the first and second calibration marker structure” in combination with the rest of the limitations of claims 1, 12, and 22, 33.

### ***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The references of Mieher et al. (Publication No. US 2003/0048458) and Bowley, Jr. et al. (U.S. Patent No. 6,917,901) teach of various features similar to the claimed invention.

### ***Fax/Telephone Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tri T. Ton whose telephone number is (571) 272-9064. The examiner can normally be reached on 10:30am - 7:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Michael A. Lyons/  
Primary Examiner, Art Unit 2877  
August 31, 2008

August 28, 2006  
Examiner /Tri T Ton/